PURCHASE ORDER

BEKER INDUSTRIES CORP.

P. O. BOX 37, CONDA, IDAHO 83230
(208) 547-4381

Purchase Order No. COF 20841

Date: July 22, 1975
Requisition No. 635
Cost Code No. 168-401A
Page: 1 of 2

TO:
Staff Industries, Inc.
1982 West Jefferson Ave.
Detroit, Michigan 48206

SHIP TO:
Beker Industries Corp.
P. O. Box 37
Conda, Idaho 83230

INSTRUCTIONS TO VENDOR

1. To validate this order, return acknowledgement copy promptly duly signed.
2. List Order No. and Item No. on all invoices, Packages and Shipping Document.
3. If shipped unit quantities are less than ordered, contact Purchasing Manager whose signature appears below.
4. Describe in detail on invoice item(s) shipped and Quantities.
5. Send invoices to:
   Beker Industries Corp.
   c/o Accounts Payable
   P. O. Box 37
   Conda, Idaho 83230

Unless otherwise specified, 2% discount will be deducted for payment 10th proximo.

Mr. Phil Randquist Ext. _____ can furnish information regarding this order.

PROMISED DELIVERY	F.O.B. POINT	SHIP VIA	BILLING TERMS	FREIGHT PPD	FREIGHT COLL
		☐ RAIL ☐ MTR FREIGHT ☐ TRUCK ☐ OTHER			

ITEM NO.	QUANTITY	U/M	MATERIAL AND DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
			Staff Industries to provide material, labor and equipment to line No. 3 Gyp Pond in accordance with the following specifications and conditions: Staff Industries, Inc. is to provide labor, equipment and materials to line the No. 3 Gypsum Pond in accordance with their quotation dated July 11, 1975, and in accordance with drawings provided by Beker Industries Corp. The Contractor is to provide a one-year guarantee on materials and labor subject to the exclusions noted in the quotation. He is to provide, further, a five-year guarantee on the sidewall material as specified in the quotation. The bottom liner material is to be 10 mil PVC which meets the standard specifications for polyvinyl chloride plastic linings as submitted by Staff Industries.		

IMPORTANT

The Vendor, by accepting this order, agrees to the general terms and conditions printed on the reverse side hereof. Please sign and return acknowledgement copy to issuing office address.

Vendor: _____

BEKER INDUSTRIES CORP.

By _____
Manager of Purchasing

I certify that the property which I have purchased P. M. Randquist for the following purpose:
☐ Sale for resale.
☐ Directly and Primarily in the process of producing tangible personal property by mining, manufacturing or for processing.
☐ To repair the equipment of machinery described above which is being directly and primarily used in the process of producing tangible personal property and would be exempt from application of sales tax were it being purchased.

Signature of Purchaser

BIC P8 9M 4-75

REQUISITIONER COPY

FH0028582

PURCHASE ORDER CONTINUATION SHEET

BEKER INDUSTRIES CORP.

Purchase Order No. COE 20841
Date: July 22
Requisition No. 635
Cost Code No. 168-401A
Page: 2 of 2

ITEM NO.	QUANTITY	U/M	MATERIAL AND DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
			The sidewall material is to be polyester reinforced coated PVC 8422 as manufactured by Shelter-Rite Corporation.		
			The Contractor is to provide adequate liability coverage for his employees and is to provide Beker Industries Corp. with evidence of such coverage.		
			The Contractor is to apply such cover material as, in his judgment, may be required to secure the liner until a water cover is established. He will also provide such personnel as may be required to remove any air pockets which may develop as the initial pond bottom cover is established.		
			The Contractor shall make all reasonable effort to complete the installation in an expeditious and workmanlike manner.		
			Beker Industries Corp. will provide a graded gypsum surface on the pond bottom, grade the pond walls to a degree suitable for sidewall liner installation, and will provide one access road to the inside of the pond. Beker Industries Corp. will also remove the access road at the appropriate time as indicated by the Contractor.		
			Lump sum payment will be made by Beker Industries Corp. after acceptance of the completed installation.		
			Sum of:		$258,491.00

Beker Industries Corporation

CONDA, IDAHO 83230

PURCHASE REQUISITION

№ 635

WORK ORDER NO. _____

1 PLANT OR DEPT. C-E-WHITE CHARGE ACCT. NO. 16-401A

REQUESTOR: M. Kelly APPROVED _____ AUTHORIZED _____

DATE 7/21/75 DATE _____ DATE _____

USE: a) FOR: _____ D-NO. _____

2 b) PART NO. _____ PER DWG. NO. _____

c) MFG. _____ MODEL _____

d) SIZE _____ TYPE _____

e) RPM, H.P., ETC. _____

3 DATE NEEDED _____ NOTIFY ON ARRIVAL _____

BY BEST WAY ☐
BY RUSH ☐
BY AIR ☐

4

ITEM NO.	QUAN.	UNITS	ARTICLE OR SERVICE (Give Complete Description)	UNIT PRICE	$ AMOUNT
					55 41
				TOTAL	55 41

ORDER PLACED:

DATE

P. O. NO.
C-

VENDOR: STAFF INDUSTRIES INC. PHONE (313) 259-1520 494-0828

ADDRESS 1980 WEST JEFFERSON AVE.

CITY DETROIT STATE MICHIGAN ZIP 48206

VENDOR REP. _____

CONFIRMED _____

VENDOR'S SHIPPING DATE _____ BY _____

F.O.B. _____ TERMS _____

4—BLUE — NOTICE OF PURCHASE TO REQUISITIONER

CS-1 (Rev.) - 5-75

FH0028584

Beker Industries Corporation

CONDA, IDAHO 83230

PURCHASE REQUISITION

№ 635

WORK ORDER NO. _____

1 PLANT OR DEPT. C.F. WHITE CHARGE ACCT. NO. 45-1001A

REQUESTOR: [illegible] APPROVED _____ AUTHORIZED _____

DATE 7/10/75 DATE DATE

USE: a) FOR: _____ D-NO. _____

2 b) PART NO. _____ PER DWG NO. _____

c) MFG. _____ MODEL _____

d) SIZE _____ TYPE _____

e) RPM, H.P., ETC. _____

3 DATE NEEDED _____ NOTIFY ON ARRIVAL _____

BY BEST WAY ☐
BY RUSH ☐
BY AIR ☐

4

ITEM NO.	QUAN.	UNITS	ARTICLE OR SERVICE (Give Complete Description)	UNIT PRICE	$ AMOUNT
				TOTAL	

ORDER PLACED:

DATE

P. O. NO.
C

VENDOR: [illegible] PHONE: (313) 379-1120 496-0828

ADDRESS [illegible]

CITY [illegible] STATE [illegible] ZIP [illegible]

VENDOR REP. _____

CONFIRMED _____

VENDOR'S SHIPPING DATE _____ BY _____

F.O.B. _____ TERMS _____

5—YELLOW — RETAINED BY REQUISITIONER

CS-1 (Rev.) 5-75

FH0028585

Our New Phone No. is:
(313) 496-0808
~~Telephone (313) 259-1820~~

STATEMENT

THIS STATEMENT SHOWS OPEN ITEMS AS OF THIS DATE

INDUSTRIES INC.
'est Jefferson Avenue • Detroit, Michigan 48216

Beker Industries, Corp
P.O. Box 37
Conda, Idaho 83230

URN THIS STUB WITH YOUR CHECK

AMOUNT _____

E	INVOICE NO.	CHARGES	CREDITS	BALANCE
	085-102			$30,289.50
	085-101			43,757.97

RECEIVED
SEP 8 1975

TOTAL DUE

$74,047.47

NTS ARE DUE AND PAYABLE IN ACCORDANCE TO TERMS STATED ON INVOICE

Telephone
(313) 259-1820

NDUSTRIES INC. 1982 West Jefferson Avenue • Detroit, Michigan 48216

FH0028586

STAFF INDUSTRIES, INC.
78 Dryden Road
Upper Montclair, N. J. 07043
201-744-5367

STANDARD SPECIFICATIONS

POLYVINYL CHLORIDE PLASTIC LININGS

01 - GENERAL REQUIREMENTS

The work covered by these specifications consists of installing a polyvinyl chloride (PVC) plastic lining in the reservoir and/or canal where shown on the drawings or directed by the Engineer. All work shall be done in strict accordance with the drawings and these specifications and subject to the terms and conditions of the contract.

02 - PVC MATERIALS

A. General. The materials supplied under these specifications shall be first quality products designed and manufactured specifically for the purposes of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes.

B. Description of PVC Materials. PVC polyvinyl chloride plastic lining shall consist of widths of calendered polyvinyl chloride sheeting fabricated into large sections by STAFF INDUSTRIES, INC. by means of special factory-bonded seams into a single piece, or into the minimum number of large pieces required to fit the facility.

1. Physical Characteristics. The PVC materials shall have the following physical characteristics.

TEST	TYPICAL TEST VALUES	TEST METHOD
Specific Gravity	1.24 - 1.30	
Tensile Strength, psi, min.	2200	ASTM D882-B
Elongation, % min.	300%	ASTM D882-B
100% Modulus, psi	1000 - 1600	ASTM D882-B
Elmendorfer Tear, gms/mil, min.	160	ASTM 689
Graves Tear, lbs/in. min.	270	ASTM D1004
Water Extraction, % max.	0.35	ASTM D1239
Volatility, % max.	0.7	ASTM D1203
Impact Cold Crack, °F.	-20	ASTM 1790
Dimensional Stability, max. % (100°C-15 minutes)	5	
Shore Durameter, "A"	65 - 75	ASTM D676
Outdoor Exposure, sun hrs.	1500	
Bonded Seam Strength, % of Tensile, min.	80%	
Pinholes/10 sq. yds. max.	1	
Resistance to Burial		Meets USBR Test (specially formulated for resistance to micro-biological attack)
Alkali Resistances		Passes Corps of Eng. CRD-572-61
Color	Black or Grey	

2. PVC Polyvinyl Chloride Materials shall be manufactured from domestic virgin polyvinyl chloride resin and specifically compounded for use in hydraulic facilities. It shall be neutral gray to black in color and produced in a standard minimum width of 54 inches. Thickness shall be as shown on the project drawings.

03 - FACTORY FABRICATION

Individual widths of PVC materials shall be fabricated into large sections by solvent bonding by STAFF INDUSTRIES, INC. into a single piece, or into the minimum number of pieces, up to 62' wide, as required to fit the facility. Lap joints with a minimum joint width of 1/2-inch shall be used. After fabrication, the lining shall be accordion folded in both directions and packaged for minimum handling in the field. Wooden boxes for packaging shall be used for all linings which weigh over 600 pounds to prevent damage to the lining during shipment.

04 - PLACING OF PVC LINING

A. General. The PVC lining shall be placed over the prepared surfaces to be lined in such a manner as to assure minimum handling. It shall be sealed to all concrete structures and other openings through the lining in accordance with details shown on drawings submitted by the contractor and approved by the Engineer. The lining shall be closely fitted and sealed around inlets, outlets, and other projections through the lining. Any portion of lining damaged during installation by any cause shall be removed or repaired by using an additional piece of lining as specified hereinafter.

1. Field Joints. Lap joints shall be used to seal factory fabricated pieces of PVC together in the field. Lap joints shall be formed by lapping the edges of pieces a minimum of 2 inches. The contact surfaces of the pieces shall be wiped clean to remove all dirt, dust, moisture, or other foreign materials. Sufficient cold-applied STAFF vinyl-to-vinyl adhesive shall be applied to both contact surfaces in the joint area and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

2. Joints to Structures. All curing compounds and coatings shall be completely removed from the joint area. Joining of PVC to concrete shall be made with STAFF vinyl-to-concrete adhesive. Unless otherwise shown on the drawings, the minimum width of concrete shelf provided for the cemented joint shall be 8 inches.

3. Repairs to PVC. Any necessary repairs to the PVC shall be patched with the lining material itself and cold-applied STAFF vinyl-to-vinyl adhesive. The adhesive shall be applied to the contact surfaces of both the patch and lining to be repaired and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

4. Quality of Workmanship. All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to scuffing, penetration by foreign objects, or distress from rough subgrade shall, as directed by the Engineer, be replaced or covered and sealed with an additional layer of PVC of the proper size.

STAFF INDUSTRIES INC. 1982 West Jefferson Avenue • Detroit, Michigan 48216 • Telephone (313) 259-1820

August 14, 1975

Beker Industries Corporation
P.O. Box 37
Conda, Idaho 83230

Attention: Bob Cook, Engineering Supervisor

Subject: Conditioning of reservoir for liner installation.

Dear Mr. Cook:

This will confirm our telephone conversation of August 13, in which, we discussed the preconditioning of the reservoir floor and dyke surfaces for installation of the liner which we are furnishing.

While the puncture resistance of Polyvinyl Chloride liner membrane is probably the best of all the widely used liner materials, it is still essential for satisfactory installation of this seepage barrier that the surface on which the liner is laid be a smooth well compacted surface free of all foreign objects which may project into the liner surface. It is recommended, if the soil is stony or coarse in texture that a layer of sand be used under the liner. You indicated that the surface in contact with the liner would be gpysum which could be worked to a fine grain size. We suggested that this surface be rolled immediately prior to the spreading of the liner thus minimizing surface irregularities caused by tires, running water, etc. This proceedure has worked very well on prior occasions and tends to minimize the labor involved by eliminating duplication of effort in maintaining a surface condition over a period of weeks of reservoir construction.

As regards to those areas (5 to 7 acres) which you indicated were soft due to an unlayment of wet clay, it will be essential that the surface be such to support a vehicle required to transport 5000 lb. pallets of the liner material for strategic placement and unfolding. The floor material will be furnished in pieces 100 ft. wide x 640 ft. long which will require transporting across the width of the reservoir in increments of 100 ft.

It is essential that the floor subsurface be such as to preclude any sink hole formations, which will stretch the liner beyond its elongation capabilities.

Sales Office: Post Office Box 797 • Upper Montclair, New Jersey 07043 • Telephone (201) 744-5367

STAFF INDUSTRIES INC. 1982 West Jefferson Avenue • Detroit, Michigan 48216 • Telephone (313) 259-1820

While the steepness of the slopes on the perimeter dykes make the compacting of the side slopes difficult, it will be essential that they be graded as smooth as possible and raked free of surface irregularities. The reinforced material on the slopes is more tolerant of surface condition and we can minimize actual walking on the slopes prior to and during liner installation.

Our installation supervisor will contact you a few days prior to the liner installation work and will review the site for incidental details of site preparation.

We look forward to working with you and to a successful liner installation.

Very truly yours,
Staff Industries, Inc.

J. J. Shields

cc: CE Staff
clb

Sales Office: Post Office Box 797 • Upper Montclair, New Jersey 07043 • Telephone (201) 744-5367

ch

STAFF INDUSTRIES INC. 240 Chene Street · Detroit, Michigan 48207 · Telephone (313) 259-1820

October 5, 1976

Mr. David Best
Beker Industries, Corporation
P. O. Box 37
Conda, Idaho 83280

Dear Mr. Best:

We are in receipt of your blueprint drawing 09-1-27 on your Decant System. You are right, you do have a little problem. Just off hand, is there any reason why the whole box can't be lowered the depth of the outlet pipe? This would make a flush bottom and would obviously eliminate some problems. At the ditch, I don't know if you have enough elevation to allow this.

Then, I would use 30 mil PVC around the redwood box and go out a few feet from the base where I would join it to the floor PVC.

Also, the Decant is about three feet too high for the Berm. If you made it the way the drawing shows you will have the same problem you had last spring, namely waves washing over the Berm and destroying it.

As you possibly know, we have four engineers at Staff Industries, but, none are practicing civil engineers. I would like to suggest that you contact a civil engineering firm that specializes in this type of installation. Namely:

Hovater-Way Engineers, Inc.
23011 Moulton Parkway
Suite F-5
Laguna Hills, California 92653

There are other details which should be considered and I highly recommend you contact the above engineers.

If we can be of further service, please advise.

Sincerely yours,

STAFF INDUSTRIES, INC.

Edward H. Staff

c.c. CE Staff
EHS/njs

Sales Office: Post Office Box 797 · Upper Montclair, New Jersey 07043 · Telephone (201) 744-5367

STAFF INDUSTRIES, INC. 1982 West Jefferson Avenue • Detroit, Michigan 48216 • Telephone (313) 259-1820

September 19, 1975

Baker Industries, Corp.
P.O. Box 37
Conda, Idaho 83230

Subject: P.O. COF 20841

Gentlemen:

This is to acknowledge that Staff Industries has completed satisfactorily the installation of the liner for your No.3 Gypsum Pond at Conda, Idaho in accordance with the terms of the above subject purchase order.

It is understood that payment for this work is due and payable to our supervisor upon signing this acknowledgement in accordance with Staff Industries acceptance of your purchase order.

The Guarantees per subject purchase order are still in effect as stated in purchase order.

Staff Industries, Inc.

By: _____

Title

Date signed: October 14, 1975

Baker Industries

BY: _____

Title

Director
Environmental Services

Title

Staff Industries, Post Office Box 207 • Upper Montclair, New Jersey 07043 • Telephone (201) 744-5557

Interoffice Memorandum

To: Mr. Leo Hilinski

Copies To:
M. Green
A. Carrozelli
K. Rowles

File Reference:

Date: March 12, 1976

From: Gerald L. Sneddon

Department: General Manager

Location: Charles F. White Plant

Subject: PRODUCT LOSS FROM NO. 3 GYPUM POND

Enclosed is our estimate of direct production loss attributable to the failure of the no. 3 Gypsum Pond.

GLS/sr

enc.

FH0028593

Interoffice Memorandum

To: Lloyd Hemman

Copies To: E. M. Green
Don Baumgartner
✓G. Sneddon

File Reference:

Date: March 6, 1976

From: Gary L. Dahms

Department: Acid

Location: C. P. White Plant
Conda, Idaho

Subject: GYP POND DIKE FAILURE

Following is my estimate of losses resulting from the failure in the Gyp Pond Dike on March 2, 1976.

The total amount of water lost was 367 acre feet or 120,000,000 gallons. By breaking the north dike of the pond, 86 acre feet (28,000,000 gallons) were diverted to the #3 tailings pond. This leaves 281 acre feet (92,000,000 gallons) which flowed south from the pond.

Using an analysis of 0.8% P_2O_5, 3,990 tons of P_2O_5 were lost from the pond.

GLD/kjp

Interoffice Memorandum

To: Lloyd Hemman

Copies To: E. M. Green
B. Cole
E. Christiansen
✓ G. Sneddon

File Reference:

Date: March 9, 1976

From: Gary Dahms

Department: Acid

Location: C. F. White Plant
Conda, Idaho

Subject: ACID AREA PRODUCTION LOSSES

The acid area production losses resulting from the #3 gypsum tailings pond dike failure were:

Date	Phosphoric Acid Plant Downtime	Phosphoric Acid Plant Production Loss	Sulfuric Acid Plant Production Loss
3/2/76	16	485 Tons	198
3/3/76	24	735 Tons	249
3/4/76	18.25	608 Tons	260
3/5/76	6.75	276 Tons	256
3/6/76			252
Total	65 Hours	2,104 Tons P_2O_5	1,215 Tons H_2SO_4

The phosphoric acid plant operation was shut down at 3 P.M. on March 2, as a result of the dike failure in the #3 gypsum tailings pond. The flood of water penetrated the transformer and switchgear for the cooling water pumps and #4 and #5 wells and soaked the motors on the cooling water pumps. Restoration of this equipment took 58.25 hours.

During this downtime, washed out portions of the gypsum tailings line were replaced and the line was routed back to the #2 pond. Washington Construction was utilized to prepare the #2 pond for service. The total phosphoric acid area downtime, including startup problems related to the two-day pond outage was 65 hours. Based on February's daily production rate of 735 TPD P_2O_5 the total production loss was 2,104 tons of P_2O_5. This total includes losses due to reduced production rates during the startup period thru March 5, 1976.

The sulfuric acid plants were not shut down during this time. However, with no return condensate from the phosphoric acid plant, sulfuric acid production rates had to be reduced to coincide with boiler feed water availability. Based on the 1700 TPD sulfuric acid production rate prior to the pond failure, 1,215 tons of sulfuric acid were lost between 3/2/76 and 3/6/76.

GD/kjp

76-

Interoffice Memorandum

Gary Dahms

L. Hemman
M. Green
D. Baumgartner
G. Sneddon

Date: March 10, 1976

From: Cal Whiting

Subject: Expansion

Location: C. F. White Plant
Conda, Idaho

LOG OF EVENTS REGARDING GYP POND DIKE FAILURE

Following is a schedule of events for 3/1/76 thru 3/2/76:

March 1, 1976 - Snowing and Cold - Temperature: H +23° L +10°

1. Washington was working on the dike build up at No. 3 pond and ramp to cooling pond.

2. It was too stormy so Washington sent most of their crew home. We asked them to leave a cat and grader to keep the dike road open.

March 2, 1976 - Cold and Clear - Temperature: H +26° L +5°

1. I made rounds at 8:00 A.M. and found the dike leaking pretty bad at the drain outlet. The flume was washed out and had dropped down from gradual slope from outlet pipe approximately 15' - 0.

2. The outlet pipe was suspended partially in mid air from center of the dike because of washout from leak under the dike.

3. I have no idea how much water was running thru, around, or under the culvert.

4. I asked Washington to start pushing fill into the dike since they were there and had already seen the situation.

5. I immediately notified the following people: Gary Dahms, Lloyd Hemman, and Moody Green of the situation.

6. Washington Construction was contacted to haul oversized rock (4" and larger) to the job site from the north end. Their trucks would not start so I notified Industrial of the urgency of hauling rock with their smaller Mack trucks (20 ton carry units).

7. Two D9 cats pushed fill and two 20 ton haul trucks hauled rock for 5½ hours. We tried plywood sheets and plastic along with the gyp fill. We would just about have the leak blocked and then it would break loose from under-cutting deeper in the dike. At about 1:30 P.M. as I was directing a load of rock to be dumped, the bank gave away 2' behind me. An area approximately 15' wide and 15' deep broke loose. There was not much we could do at this point.

8. I asked about letting loose of the dike at the north side which would allow drainage into the tailings pond. At approximately 3:00 P.M. I waded thru the water across from the south calciner and up to the area where Washington had a D9 cat and operator still working. He and I went to the north dike and began cutting the dike at 4:15 P.M. We had the water running by the time another cat came in from the north end of the plant from Washington Construction.

9. At approximately 10:00 P.M. the south dike was being sealed in (the pressure was off this area by now). The north end was plugged at approximately 9:00 A.M. the following morning. It was cold all night at a -16^{o}.

10. I began working on the plant access road on March 3, 1976. The ponds were being taken care of by operations and Washington Construction.

CW/kjp

Carl Whiting

7C

Affiliated FM Insurance

New Providence Corporation, Underwriting Manager

LOSS REPORT

DIFFERENCE IN CONDITIONS - MISCELLANEOUS PERILS

FOR BEKER INSUDTRIES CORPORATION
Conda Rd. & Rte. 34 N
Soda Springs, Idaho

INDEX 79228.61A

ACCOUNT 23-28879

DATE OF LOSS March 3, 1976

BY R.K. Okimote

DATE INSPECTED June 7, 1976
June 8, 1976

WITH See Below

LOSS NO. NPC-01220

Conference With Messrs: J. Sneddon, Gen. Mgr; K.R. Rowles, Pers. Mgr.;
D. Best, Proj. Engr; C. Whiting, Proj. Eng;
G.L. Dahms, Acid Area Supt.

SUMMARY

The dike of Gypsum Pond No. 3 broke at the drain outlet at this Agricultural Chemical Plant. About 92 million gals. of reclaim water dumped onto nearby farm land.

DESCRIPTION

Gypsum Pond No. 1 is a cooling pond where clear water is pumped back into the plant to reclaim the phosphoric acid still in the water. Gypsum Pond No. 2 was not in service. Gypsum Pond No. 3 is divided into two sections. The south section is the Gypsum settling pond and contains about 92 million gals. of water with an 8% concentration of phosphoric acid P_2O_5. The north section is a tailings pond.

INCIDENT

Workmen, building up the dike on Gypsum Pond No. 3 noticed no sign of leakage Monday afternoon. However, Tuesday, March 2, they noticed leakage about 7:15 a.m. at Gypsum Pond No. 3 south section drain outlet and notified superiors who arrived at the leak about 7:45 a.m. The 36 in. diameter drain outlet pipe (reinforced fiberglass) was suspended partially in mid air due to severe wash out under the pipe by a stream of water. Two bulldozers pushed Gypsum and two 20 ton haul trucks dumped rock 4 in. and larger for about 5½ hours (8:00 a.m. - 1:30 p.m.) to block the leak. Plywood sheets, plastic liner, and other fill materials were also used but could not stop the leak, about 1:30 p.m., a 15 ft. wide by 15 ft. deep section broke loose releasing the contents of the pond.

(over)

DAMAGE AND SALVAGE

Ninety-two million gals. of water with an 8% concentration of phosphoric acid were lost. Six electric motors for the transfer pumps had to be rewound. The north dike of Gypsum Pond No. 3 (south section) was cut open to allow drainage into the north section. The hole caused by the leak in the dike was 20 to 30 ft. wide at the top and 20 to 21 ft. deep. The overflow pipe structure and concrete flume were washed out. Gypsum Pond No. 3 is being repaired and will be returned to service.

INTERRUPTION TO PRODUCTION

The two Sulfurice Acid Plants and the Phosphoric Acid Plant were shut down for about 65 hours, March 2 to 6, 1976 due to the time required to clean out the No. 2 pond and install the proper outlet and inlet lines from the acid plants, work was slow due to below freezing weather.

CAUSE

The failure was caused by a leakage around the drain outlet which quickly eroded away the Gypsum fill material and grew more quickly than could be filled.

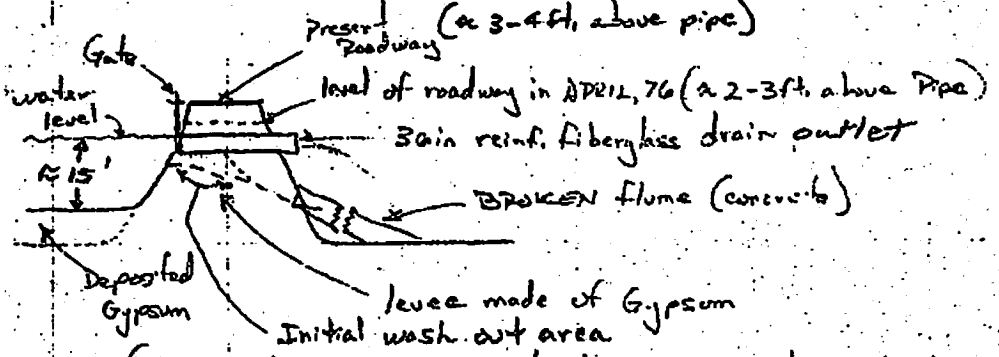
DISCUSSION

The overflow system installed in Gypsum Pond No. 2 was modified from the system used for Gypsum Pond No. 3 and uses a wood overflow box, which is a three sided box with on side open. This box can be adjusted for overflow rate and the level of water maintained above the deposited Gypsum by adding or removing boards on the open side of the box. (See sketch). The "old" system (installed Sept. 1975) for Gypsum Pond No. 3 used more of a dam principle and since the pipe was about 15 ft. higher than the level of the deposited Gypsum, a minium of 15 ft. water level had to be maintained, whereas with the overflow box the level of the water can be kept at 1 ft. above the deposited Gypsum. Using this box system the exposure to leakage is greatly reduced because the amount of water is greatly reduced.

RECOMMENDATIONS

1. The new overflow system should be designed to minimize the chances of leakage around the area of the new drain pipe.

2. The repair work on Gypsum Pond No. 3 (south) should be expedited as much as practical so business interruption will be minimized should Gypsum Pond No. 2 develop a leak.

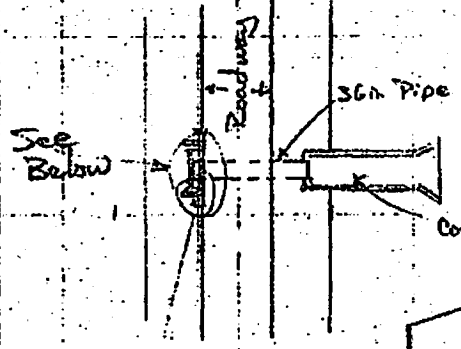


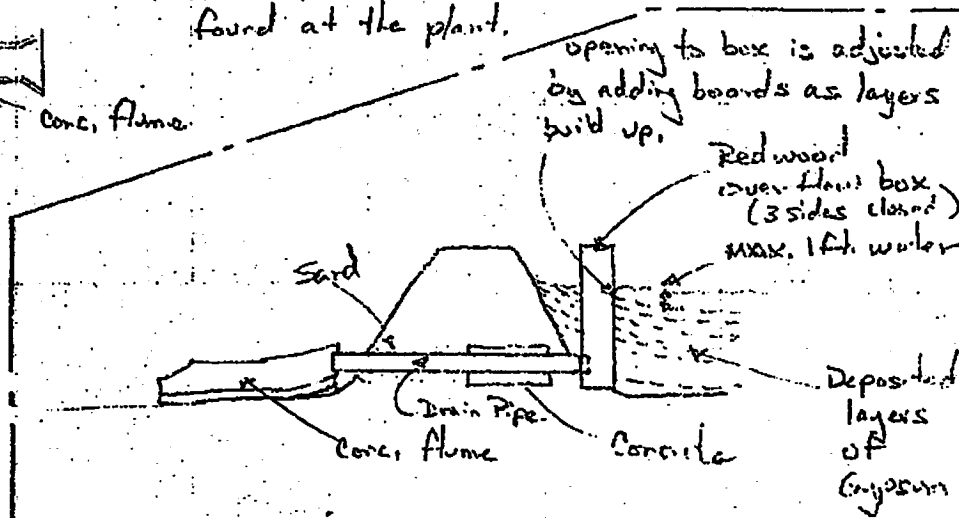
NOTE: Bottom of pond is 10 mil PVC plastic liner & side walls have 8 mil polyester reinforced coated pvc liner.

(How Situation Appeared at 8:00 A.M. Tues. March 2, 1976)
Per description & sketch by C. WHITING, Proj. Engr.
SIDE VIEW or Cross section looking east.

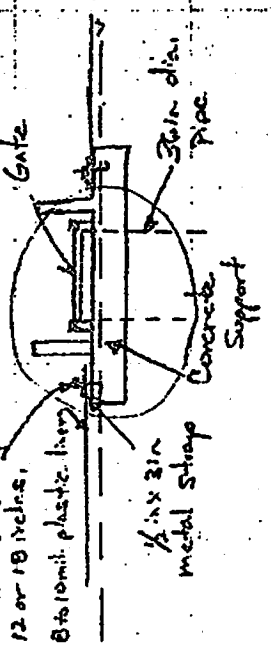
TOP or PLAN VIEW (as described by G. L. DAVIS, Acid Supt.)

NOTE: NO DRAWINGS OF THE PIPE SUPPORTS & Details of liner seal at drain could be found at the plant.





General features of Proposed new overflow System presently in planning stage.



BEKER INDUSTRIES CORPORATION

SODA SPRINGS, IDAHO

For Insr. Dept. of R. K. Okimoto
Dated June 8, 1976
Scale: NO SCALE

FACTORY MUTUAL ENGINEERING ASSOCIATION
Factory Mutual System
1151 BOSTON - PROVIDENCE TURNPIKE, NORWOOD, MASS. 02062

Ind. No. 7923 B61
Tr. No.

Form No. 380 Plan Rev. Apr. 1969.

FH0028600

BECKER

Interoffice Memorandum 7d

To:	Alex Carrozelli Jack Asche	*File Reference:*	
Copies To:	G. Sneddon D. Dean L. Henman D. Fleming D. Best	*Date:*	December 28, 1976
		From:	Gary L. Dahms
		Department:	Phos Acid Administration
		Location:	C. F. White Plant Conda, Idaho

Subject: #3 GYPSUM TAILINGS POND DIKE FAILURE

The acid loss claimed in the #3 Gypsum Tailings Pond Dike Failure was all water soluble, recoverable product. This means that the acid was basically in a useable form. Although it was not concentrated enough to use at this point, all of the raw material costs to make product acid had been put into it. It need only be recycled through the digestion reaction in place of the raw water required for the reaction to be converted to 28% P_2O_5 acid. The only costs to make this conversion would be the pumping costs which would be more than offset by the pumping costs of the well water which is used when pond water is not available.

The volume of solution used in the claim was based only on the liquid which was "free-standing" above the gypsum. Although there was a substantial amount of water in the gypsum, none of this was used because of the difficulty in calculating the amount and the strength of this acid. The solution used in the claim was only that which was already separated from the gypsum solids.

There has been speculation by outside groups that some P_2O_5 is lost from standing in the ponds due to chemical reactions and settling with the gyp. Since we are dealing with the solution which was already separated from the gypsum, there is no basis for the belief that some of it may have settled in with the gypsum tailings. This may occur, but we are not working with the solution in the gypsum. It was already separated from the gypsum.

Our analysis of the gypsum tailings pond system indicated there would be no loss of P_2O_5 due to chemical reactions in the "free-standing" portion of the pond. The pH of the pond water is 1.0 to 1.2 at a temperature of 32°C. At these conditions, all P_2O_5 would exist as H_3PO_4 and the ions necessary to form iron and aluminum phosphate would not be present. The P_2O_5 concentration is less than 1%. With this temperature and P_2O_5 strength the dihydrate form of gypsum is extremely stable (See Figure 5). The solubility of this gypsum in the pond water would be 0.25% (See Figure 1). The free sulfuric acid in the pond is 0.55%. This low concentration of gypsum and relatively high free sulfuric acid would prohibit the loss of any P_2O_5 in the form of dicalcium phosphate in the "free-standing" portion of the pond. Another possible P_2O_5 loss could result from substitution of P_2O_5 in the gypsum crystal lattice which could bind P_2O_5 and precipitate it with the gypsum. As can be seen in Figure 2, the pond is somewhat out of the range at which this can occur (100 G/L = 9% P_2O_5). In addition, the "free-standing" portion of this pond would not have enough gypsum present to promote this reaction.

A certain amount of P_2O_5 upgrading occurs in the pond as it cools. The average temperature of the pond is 43°C at the inlet and 30°C at the outlet. The inlet solution is saturated with sodium and potassium fluosilicates. During the

cooling process, the solubility of sodium fluosilicate drops from 1.3% to 0.7%. The solubility of potassium fluosilicate drops from 0.6% to 0.4% (See Figure 3). This loss of diluents would result in a 0.8% upgrading of the P_2O_5 in solution. Even more upgrading would result from the normal evaporation rate in this area.

The P_2O_5 in the pond water is recovered by using it for the water of hydration in the formation of dehydrate gypsum and for the dilution water in the product. Some of this water is added directly to the digestion reaction. The remainder is first used for the three stage countercurrent wash on the filters and then added to the digester. When the water is used in the reaction the P_2O_5 content reports to the 28% P_2O_5 product acid with no further treatment.

A P_2O_5 balance in the pond system is shown in Figures 6,7, and 8. Figure 6 shows a balanced pond system with the phos acid plant operating at 93% total P_2O_5 recovery. Well water is added to the digester. All of the filter wash water comes from the cooling pond. Figure 7 shows the pond system while the #3 pond was filling up and the water could not be recovered. In this case the sluice water had to be raw water and the amount of wash water was somewhat reduced. Additional well water had to be added to the digestion system to balance the reaction. Figure 8 shows the system which is used when the pond level gets high. This is the system shich would have been used to reclaim the pond water. In this system, very little well water is added to the digestion system. The P_2O_5 which is in the pond water added to the digester reports directly to the product stream and moves on to the evaporation step. This is not a hypothetical case. It has been used in the past to reduce pond levels. When this case is in practice, the actual plant recoveries are 94.9%.

GLD/kjp

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Interoffice Memorandum

To: Alex Carrozelli

Copies To: G. Sneddon
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D. Fleming
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GLD/kjp

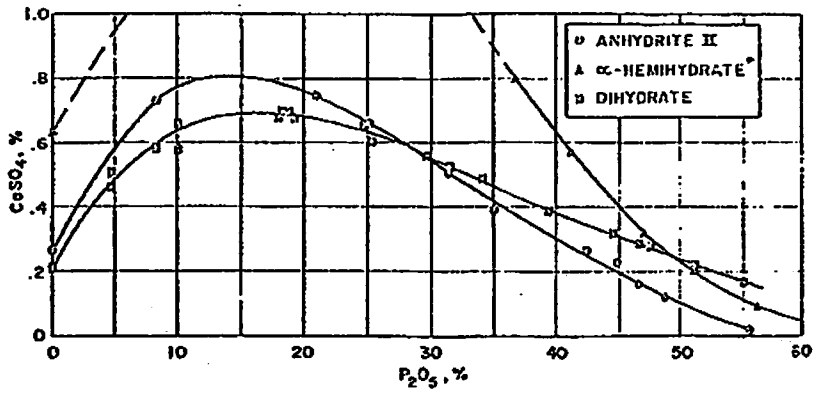

FIG. 9. Solubility of dihydrate, α-hemihydrate*, and anhydrite II in phosphoric acid solutions at 25°C. [After Taperova and Shulgina (6).]

Figure 1

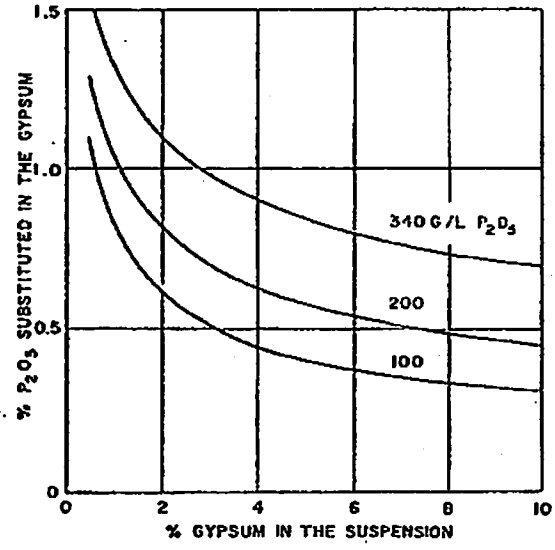

FIG. 8. Substitution of P_2O_5 in gypsum at 70°C as a function of the percentage of solids in suspension and the momentary concentration of P_2O_5 in the mother liquor. [After Fröchen and Becker (23).]

Figure 2

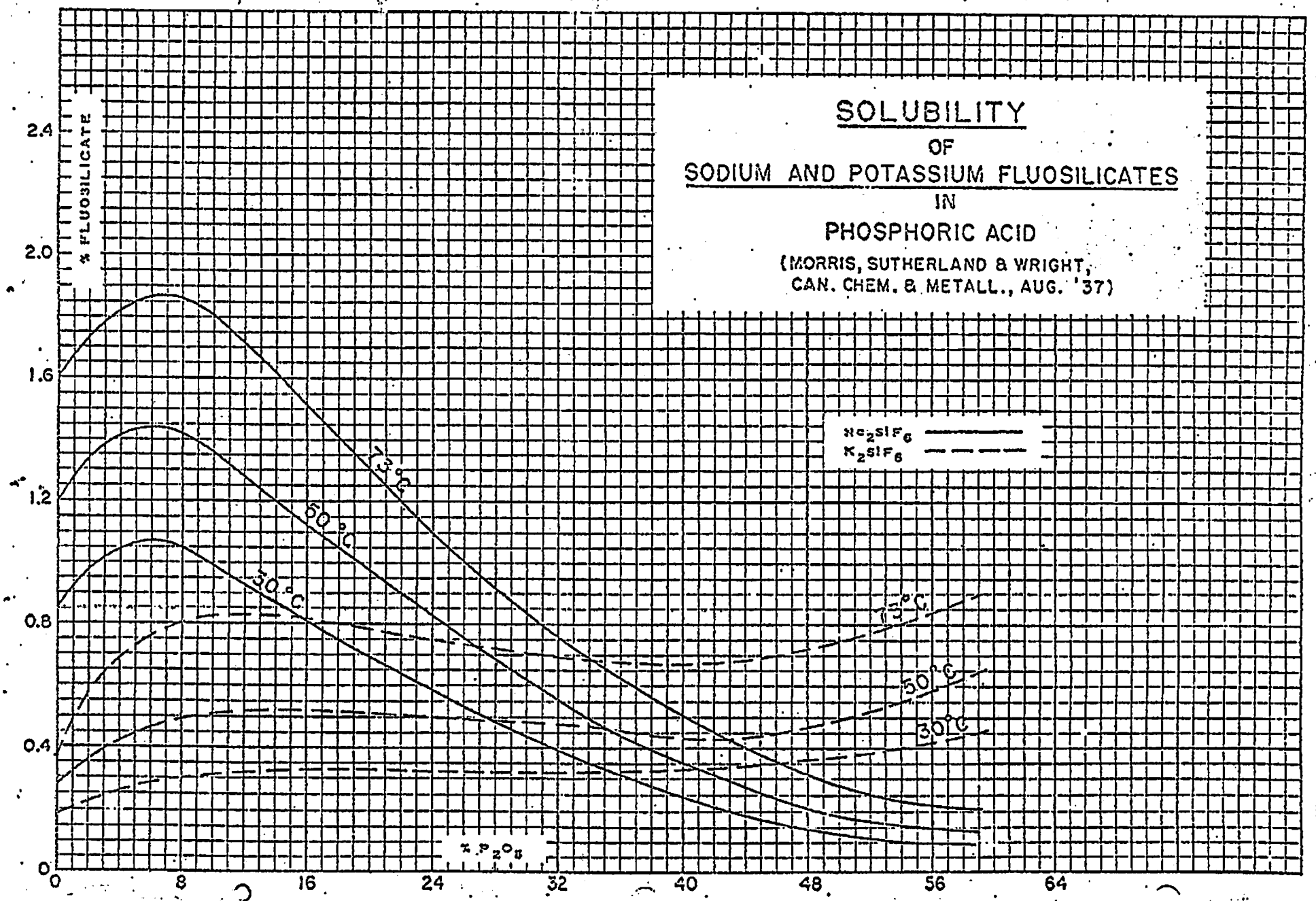

Figure 3

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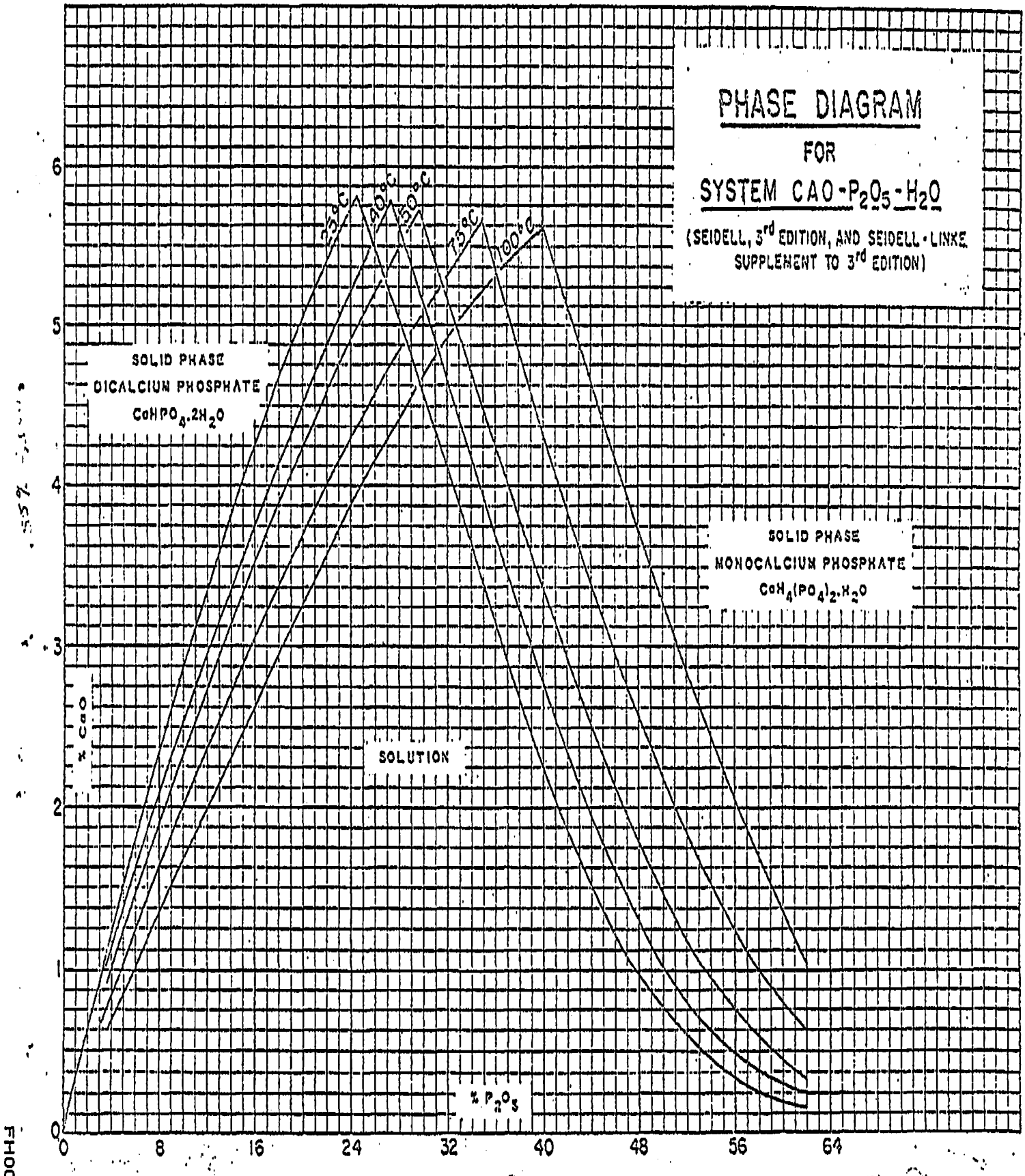

Figure 4

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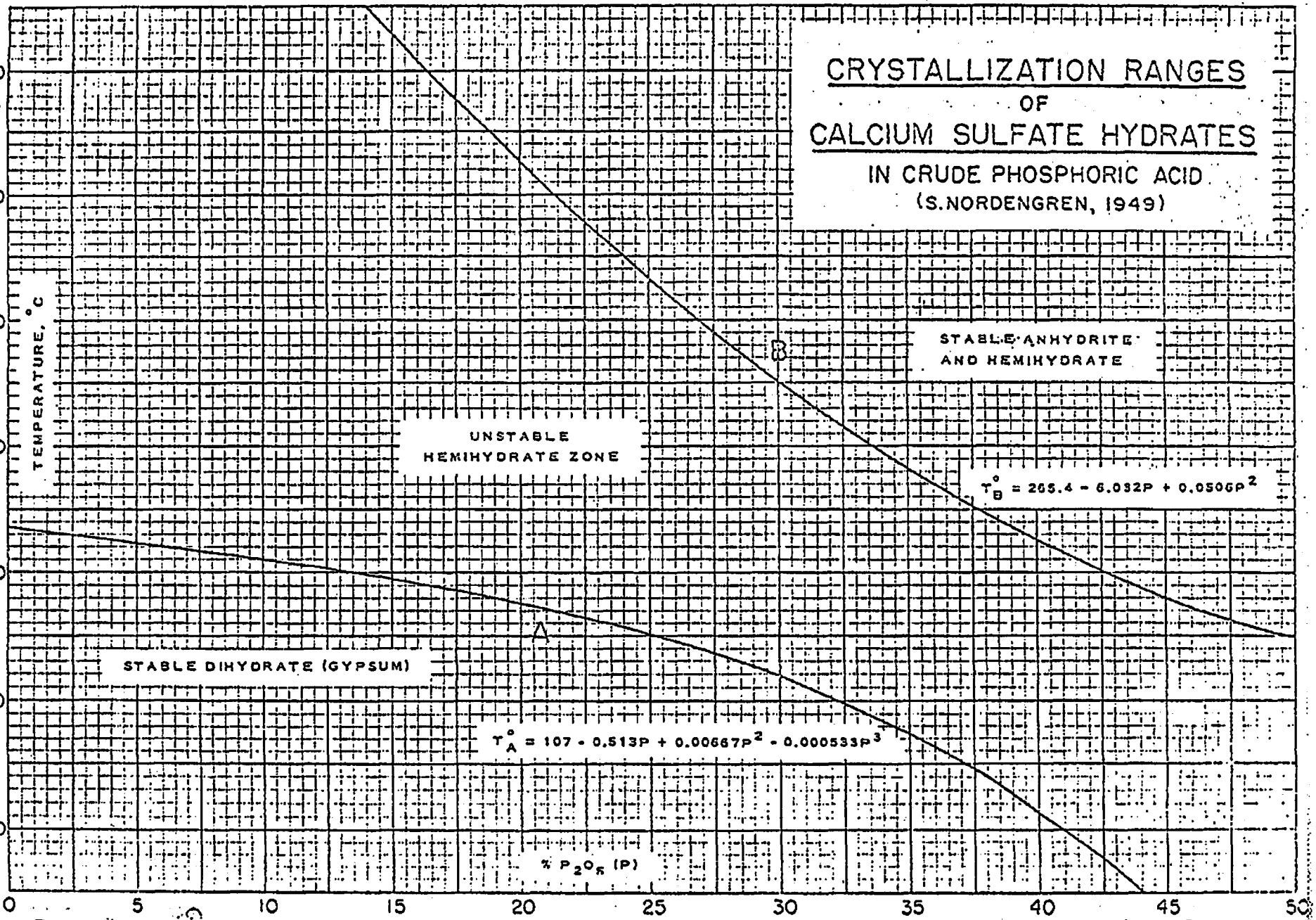

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Figure 5

CASE I BALANCED POND SYSTEM

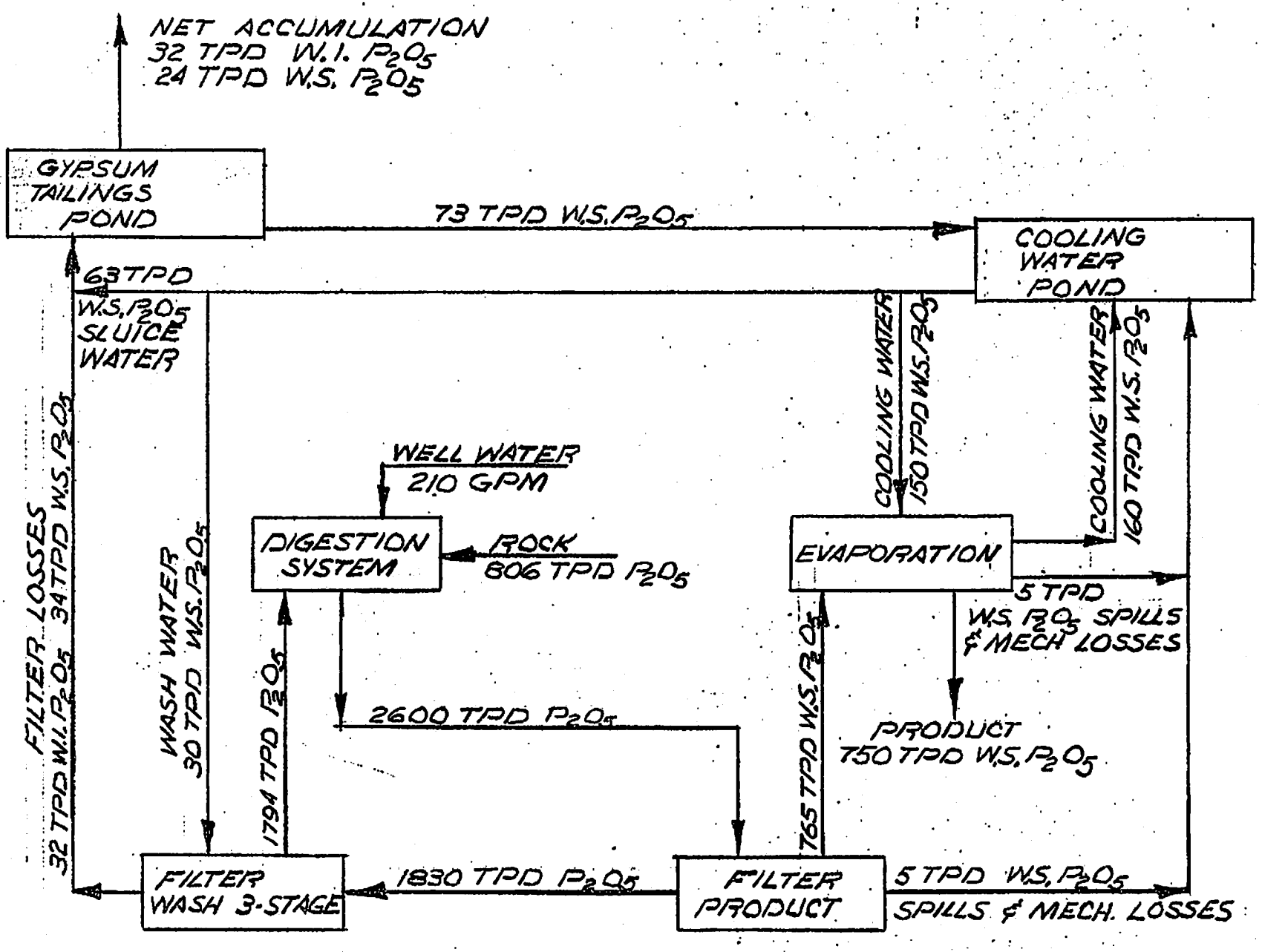

Figure 6

FH00286609

CASE II POND SYSTEM WHILE FILLING NO. 3 POND

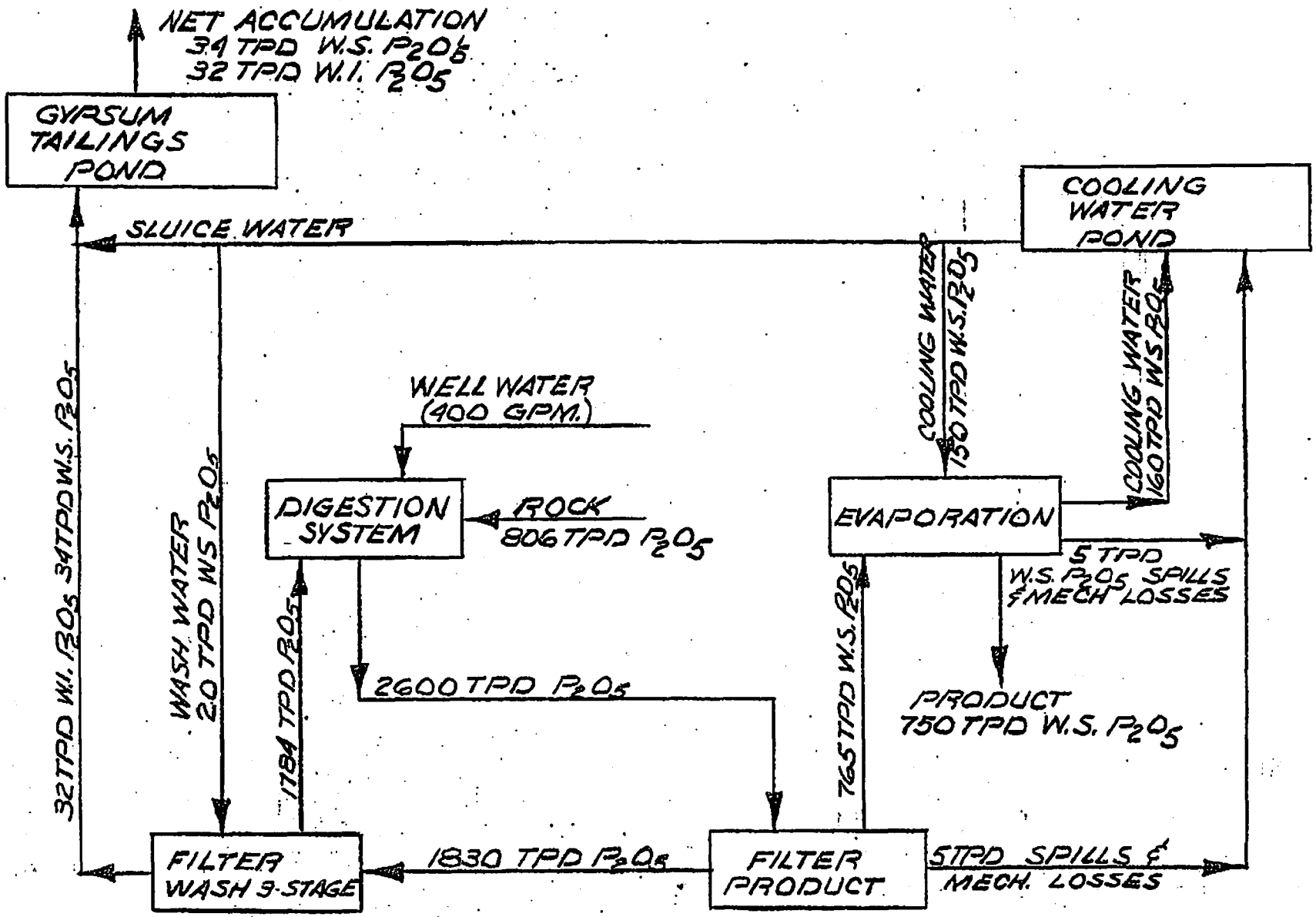

Figure 7

FH0028610

CASE III RECLAIMING P_2O_5 IN GYP TAILINGS POND

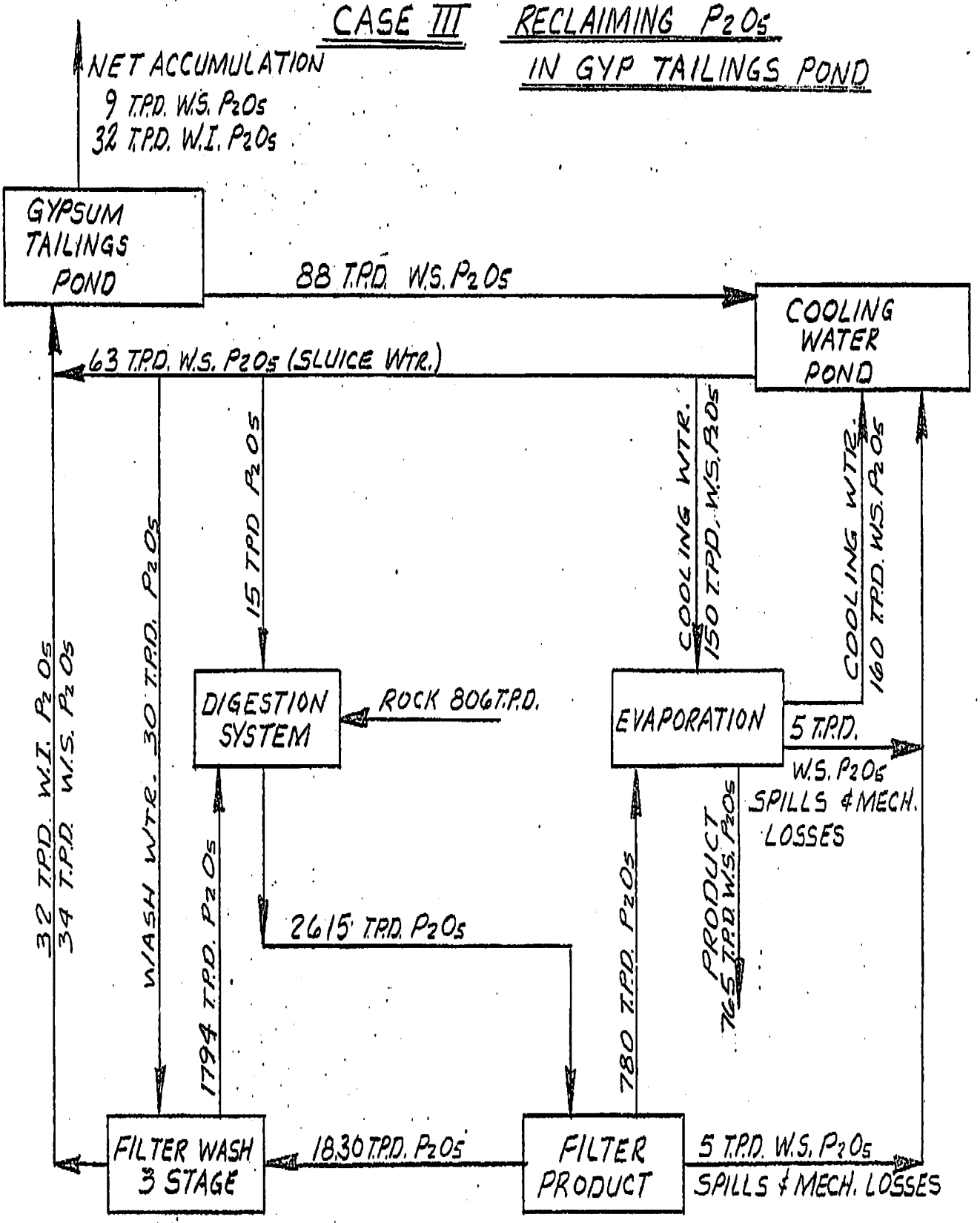

Figure 8

FH0028611